WR7500-UM-151

TRLR

INSTRUCTION MANUAL

for

LINEARCORDER mini

WR7500

SHOP
COPY

MAR 2 4 1995

CONTROLLED
DOCUMENT

WESTERN GRAPHTEC, INC.
11 Vanderbilt
Irvine, CA 92718-2067

We would like to express our appreciation for your purchase of the WR7500 Linearcorder Mini.

To ensure that you get the most out of your new recorder, we recommend that you read this manual carefully before use.

Outline

The WR7500 is a 2-channel vertical-type pen oscillograph featuring a recording width of 40mm and pen motors with 70Hz response.

The recorder may be powered from either AC line power or 12VDC and an optional 12V battery is available, enabling approximately three hours of normal use. The WR7500 includes an internal battery charger which charges the battery as it is powered from the AC line.

Features

- Lightweight and Compact

  The WR7500 is a highly portable vertical-type recorder which is designed for light weight and compactness. It is ideal for rack mounting as well.

- AC/DC Power

  The recorder may be powered by 100VAC (115/200/220/240V also specifiable) or 12VDC power.

- High Response Speed Recording

  10mm pp response up to 70Hz

- Marker Recording

  Switchable event and timing markers are provided as a standard feature.

- Remote Control

  Remote control functions include chart feed synced to an external signal, chart feed START/STOP control, event marker ON/OFF and pen heat ON/OFF control.

- Printing Function (Option)

  This option enables the printing of the year/month/day or hour/minute/second (or elapsed time) and chart feed speed.

Before Using the WR7500

Unpacking

After unpacking the WR7500, inspect the appearance of the recorder and verify that all the required accessories have been received, referring to the table in Section 9.4. Should damage or a shortage be noted, consult your local sales representative.

Installation Location

The WR7500 is used in a normal indoor environment in a vertical position.

- Avoid locations subject to excessive dust, dirt, salt and corrosive gases.
- Avoid using the recorder in locations with temperatures or humidities outside the specified ranges.
- Avoid using the recorder in locations subject to direct sunlight.
- Avoid using the recorder in locations subject to excessive vibration and shock.
- Avoid using the recorder in locations which would subject the recorder to surge voltages such as those resulting from lightning and electromagnetic interference.

Power Supply

Power the WR7500 from either a power line having a voltage of ±10% with respect to the specified voltage and a current capacity of 10A (for 100VAC) or from a 10.5 ∿ 15VDC supply having a current capacity of 30A. The AC line should be one which enables easy grounding.

Recording Paper

This recorder uses thermal recording paper. The coloration characteristics, surface smoothness and other characteristics of the thermal recording paper have a great influence on the quality of recorded traces. Always use Graphtec recording paper.

Recording Pens

Do not touch the pens except when changing them. Do not set the pen pressure excessively low or float the pen off the recording paper, as this can damage the pens.

Notes on Data Storage

The recording paper used with the WR7500 makes use of a thermal reaction to record data. The following points should be observed, therefore, when handling recorded data.

- Do not store recordings where they will be subjected to direct sunlight.
- Do not store recordings at temperatures of 50°C or above.
- Store in a location as free as possible from light. Subjecting the recordings to exposure from fluorescent or natural lighting will cause a loss of recorded contrast after several months.
- Do not store recordings in PVC bags.
- Do not allow wet diazo paper to come into contact with the recordings.
- Do not allow the recordings to come into contact with acids, alcohol or ester ketone.

Pen Protection Functions

To protect the pen tips, the following pen-protection functions have been provided.

- Whenever the recording paper has run out, the pen heat is switched off and the pens are stopped.
- When the STOP switch is pressed and the recording paper stops, the pen heat is switched off and the pens are stopped.
- When the writing panel lift lever is lowered and the recording panel is pulled out, the pen heat is switched off and the pens are stopped.
- When the pinch roller lever is lowered, the pen heat is switched off and the pens are stopped.

Recording Paper Mounting

Always verify that the HEAT switch is OFF before mounting recording paper.

Alarm Beeper

When powering the WR7500 from a DC power supply or the optional battery, if a beeper sounds, set the POWER switch to OFF. This beeper indicates that the power supply voltage has dropped to approximately 10VDC or below.

High-Frequency Input

The servo system accuracy is guaranteed as long as the servo amplifiers remain unsaturated. Care is required, therefore, to ensure that a high-frequency input exceeding the pen response speed is not applied.

Optional Battery

Before using the optional battery, charge it using the WR7500 mainframe.

Table of Contents

		Page
1.	NAMES AND FUNCTIONS OF PARTS	1
1.1	Top View	1
1.2	Front Panel Description	2
1.3	Transport Section	6
1.4	Rear Panel Description	7
2.	CHART PAPER MOUNTING	9
3.	POWER SUPPLY CONNECTION	12
3.1	AC/DC/Battery (Option) Power Source Selection	12
3.2	AC Power Line Connection	12
3.3	DC Power Supply Connection	13
3.4	Battery (Option) Connection	15
3.5	Battery Charging	16
4.	INPUT SIGNAL CONNECTIONS	17
4.1	Input Lines	17
4.2	Connection	18
5.	MEASUREMENT AND RECORDING	20
5.1	Input Waveform Recording	20
5.2	Marker Recording	21
6.	REMOTE CONTROL	22
6.1	CHART-STOP Signal	22
6.2	CHART-CLOCK Signal	23
6.3	HEAT Signal	24
6.4	EVENT-1 Signal	24
6.5	EVENT-2 (Option) Signal	25

Table of Contents

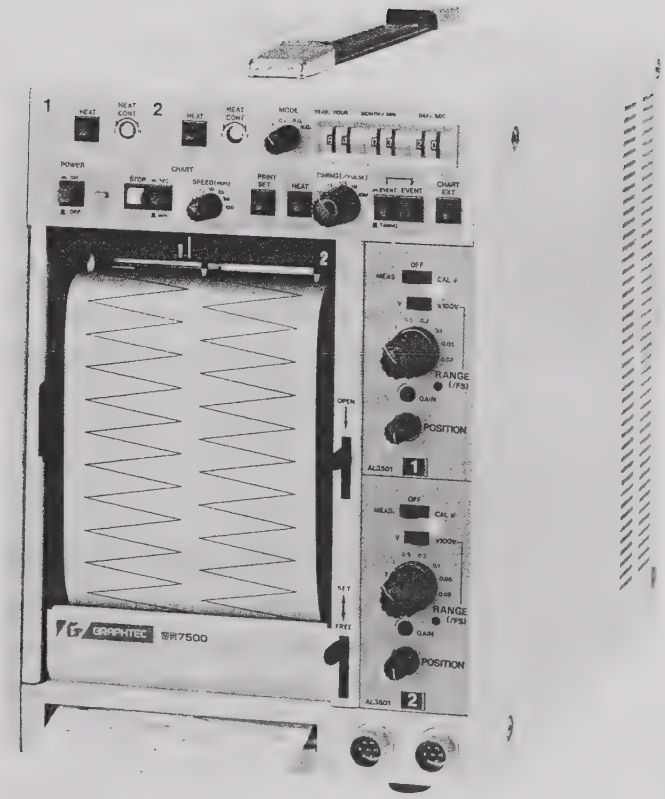
		Page
7.	PREAMP UNITS	26
8.	PRINTER (Option)	29
8.1	Internal Mode	29
8.2	External Mode	34
9.	SPECIFICATIONS	39
9.1	Mainframe Specifications	39
9.2	Preamplifier Specifications	40
9.3	Options	41
9.4	Accessories	42
10.	OUTER DIMENSIONS	43
11.	INSPECTION CERTIFICATION	44

Digitized by the Internet Archive
in 2025

https://archive.org/details/manualsplus_06306

1. NAMES AND FUNCTIONS OF PARTS

1.1 Top View



1.2 Front Panel Description

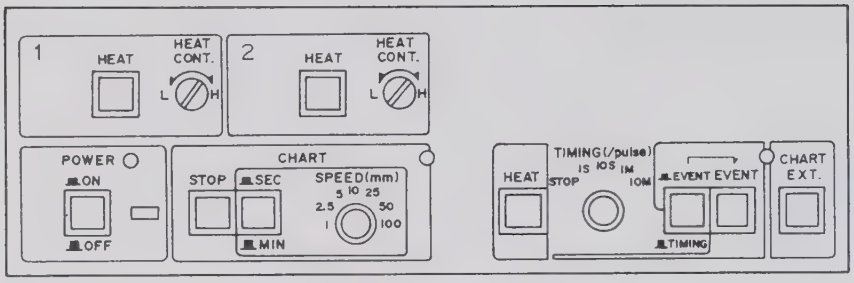
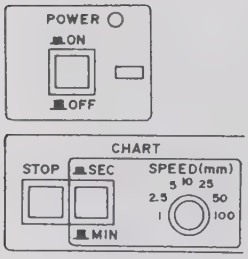


Fig. 1-3



POWER

This switch turns the WR7500 power ON and OFF. When pressed to lock it in the in position, the power is applied and the pilot lamp to the right of the switch lights. Pressing it once again turns the power OFF.

STOP

This is the chart feed STOP switch. Pressing it to lock it in the in position stops the chart feed. Pressing it once again releases the lock and the chart feeds at the set speed.

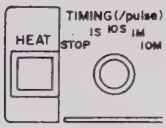
SEC/MIN

This switch is used to select the units for the chart feed speed. When pressed to lock it in the in position, the chart feed speed is mm/s. If pressed

once again to release the switch lock, the units are mm/min.

SPEED

This is the chart feed speed selection switch. It operates only when the CHART EXT. switch is not depressed. It may be set at one of seven speeds in the range 1 ∿ 100.

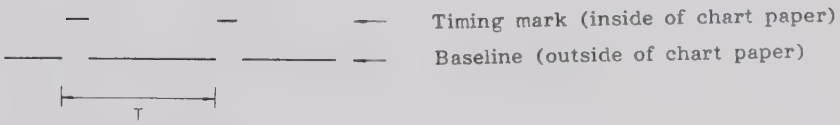


HEAT

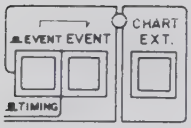
This switch is used to control the heat of all recording pens, the marker and the printing head (optional). When pressed to lock it in the in position, heat will be applied if the other switches are set to satisfy recording conditions.

TIMING

This switch selects the marker pen recorder timing signal. When the EVENT/TIMING switch is not depressed (i.e., in the timing condition), the timing signal interval may be set to 1s, 10s, 1min or 10min. When at the STOP setting, only the baseline is recorded.



Timing signal interval



EVENT/TIMING

This switch is used to select either the event marker or the timing marker. When pressed to lock it in the in position, the event marker is selected. When not depressed, the timing marker is selected.

EVENT

This switch is used to record an event mark. Note that this switch is only operative when the EVENT/TIMING switch is set to EVENT. The mark is recorded as long as the switch is kept depressed.

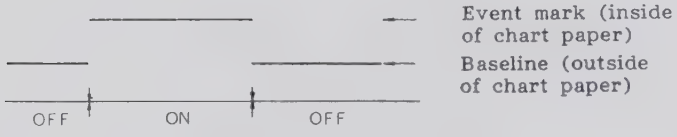
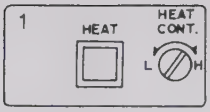


CHART EXT.

This switch is used when an external pulse signal is applied to synchronize the chart feed. When pressed to lock it in the in position, an external pulse signal synchronizes chart feed and when not depressed, the SPEED and SEC/MIN switches determine the chart feed speed.



HEAT

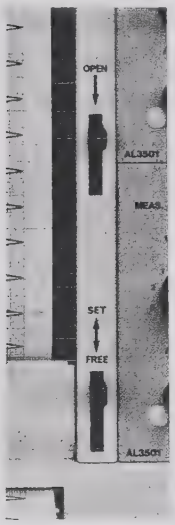
These are the individual heat switches for each recording pen. When the switch is pressed to lock it in the in position, the corresponding pen is powered (i.e., heat is applied), the recording signal is connected and the pen is deflected.

When the switch is pressed once again to release the lock, the pen heat is switched off, the recording signal is disconnected and recording is interrupted.

HEAT CONT

This trimmer adjusts the recording density. Turning the adjustment clockwise increases the recording density.

1.3 Transport Section



Writing Panel Pullout Lever

This lever is used when mounting chart paper. By lowering this lever, the writing panel is tilted forward, enabling the chart paper to be removed or mounted (refer to Section 2).

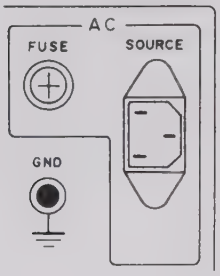
With the lever lowered, pen operation stops and the pen, marker and printing head (optional) heat sources are switched OFF.

Pinch Roller Lever

This lever is used to move the pinch roller which feeds the chart paper. It is used when chart paper is mounted. When the lever is lowered, the pinch roller moves, enabling the chart paper to be fed manually.

With the lever lowered, pen operation stops and the pen, marker and printing head (optional) heat sources are switched OFF.

1.4 Rear Panel Description



AC SOURCE

This is the AC power connector. It is a 3-pin connector with a protective conductor.

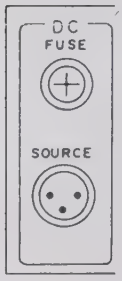
AC FUSE

This is the AC power supply fuse. The fuse rating will depend upon the line voltage used, as follows.

AC 100V, 115V	4A
AC 200V, 220V, 240V	2A

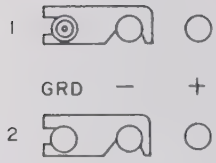
GND

This is the protective ground terminal which is connected to the protective conductor of the AC power line connector and the case.



DC SOURCE

This is the DC power supply connector. When driving the WR7500 from a 12VDC source, make connection at this connector. This connector is used also when using the battery (optional) to drive the WR7500.



DC FUSE

This is the DC power supply fuse. The fuse rating is 15A.

\+ − GRD

These are the input terminals. Three terminals (+, −, GRD) are provided, and all of these terminals are floating from the case (GND).

EXT. CONTROL

This connector is used to apply external signals used to control the WR7500. Refer to Section 6 for information on remotely controlled operation.

2. CHART PAPER MOUNTING

When mounting chart paper, always press in the HEAT and STOP switches first.

1 Pull out the writing panel and lower the lever.

2 Pull the writing panel knob forward and lower the writing panel towards the front (see Fig. 2-1).

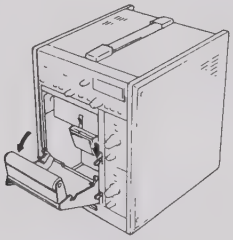


Fig. 2-1

3 Insert bobbins at both ends of the chart paper.

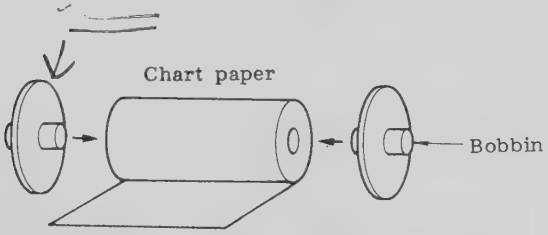


Fig. 2-2

4 Insert the chart paper with its two bobbins into the bobbin holders of the recorder stock section (see Fig. 2-3).

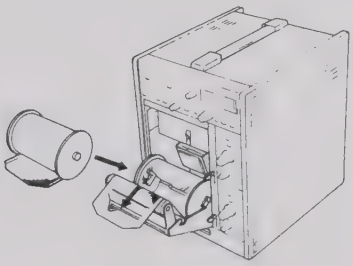


Fig. 2-3

5 Pass the recording paper over the rubber roller and pull out over the writing panel.

6 Press the writing panel to return it to its original position. When doing this, press the writing panel until the writing panel pullout lever returns to its original (upper) position.

7 Lower the pinch roller lever to the FREE position.

8 Pass the chart paper to the chart paper window A at the bottom of the writing panel (see Fig. 2-3).

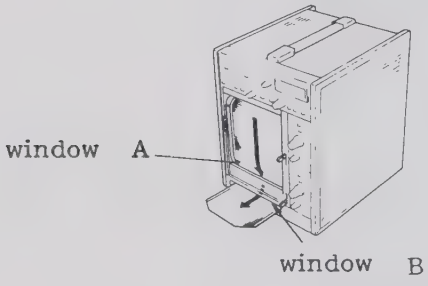


Fig. 2-4

9 When the chart paper extends beyond window B , pull it out by hand.

10 Lift the pinch roller lever to the SET position. This causes the pinch roller to come into direct contact with the chart paper, enabling chart paper drive.

11 Set the STOP switch to OFF (undepressed condition) and try feeding the chart paper.

If the chart paper is passed through chart paper window A but does not come out of chart paper window B , set the pinch roller lever to SET and try feeding the chart paper. The chart paper will be driven and will exit at chart window B .

3. POWER SUPPLY CONNECTION

3.1 AC/DC/Battery (Option) Power Source Selection

The WR7500 may be powered from either an AC line or from a DC power supply. In addition, an optional 12V battery may be used, with this battery power being applied at the connector normally used for DC power supply.

1 If an AC line power source and external DC power supply are connected simultaneously, a relay circuit operates and the WR7500 is powered from neither of these power sources.

2 If an AC power line and battery are simultaneously connected to the WR7500, a relay circuit operates so that the recorder is powered from the AC power line. In this case, the battery will be charged.

3 When the DC power supply or battery voltage falls below approximately 10V, a beeper sounds as an alarm. The WR7500 recorder should be powered from a DC supply of 10.5 ∿ 15V.

3.2 AC Power Line Connection

Preparation

Set switches as follows before making the connection.

1 Set the POWER switch to OFF.

2 Set the HEAT switch to OFF.

3 Set the STOP switch to OFF.

Connection

Insert the plug of the accessory AC power cable into the AC power outlet. If the power line used does not provide a protective ground conductor, connect the ground terminal to ground (see Fig. 3-1).

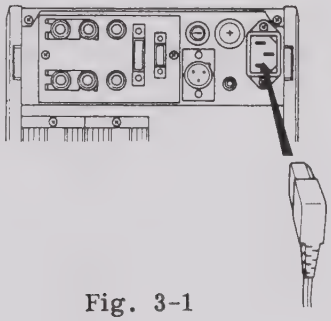


Fig. 3-1

3.3 DC Power Supply Connection

Preparation

Set switches as follows before making the connection.

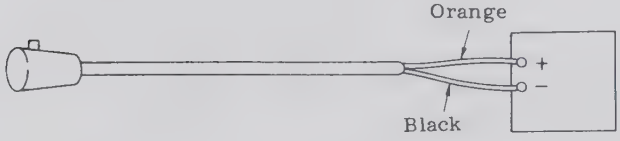
1 Set the POWER switch to OFF.

2 Set the HEAT switch to OFF.

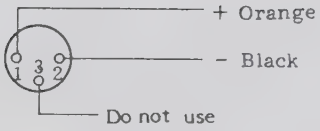
3 Set the STOP switch to OFF.

Connection

1 Connect the accessory DC power cable to an external DC power supply. Connect the orange lead to the positive (+) side and the black lead to the negative (-) side.



External DC supply (12V)



2 Insert the connector of the accessory DC power cable into the DC SOURCE connector of the WR7500 (see Fig. 3-2).

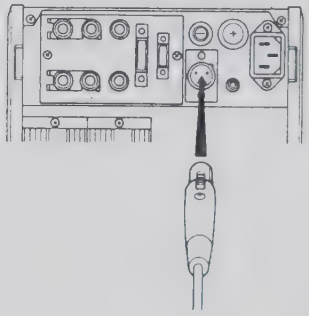


Fig. 3-2

3.4 Battery (Option) Connection

Preparation

Set switches as follows before making the connection.

1 Set the POWER switch to OFF.

2 Set the HEAT switch to OFF.

3 Set the STOP switch to OFF.

Connections

Connect the connector coming out of the battery case to the DC SOURCE connector of the WR7500 (see Fig. 3-3).

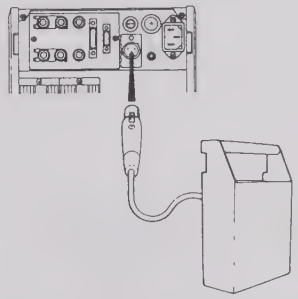


Fig. 3-3

> Battery Operating Life
>
> Under normal operating conditions (recording of a full scale sinewave at approx. 10Hz), the battery enables operation for approximately three hours.
>
> When the battery voltage drops, a beeper will sound. If this occurs, charge the battery.

3.5 Battery Charging

If the AC power supply is connected (Section 3.2) and the battery is connected (Section 3.4) simultaneously, the battery will be charged in approximately 20 hours. When these connections are made, the WR7500 is powered from the AC line. There is no need to remove the connection to the battery after this 20 hour charging period has elapsed (see Fig. 3-4).

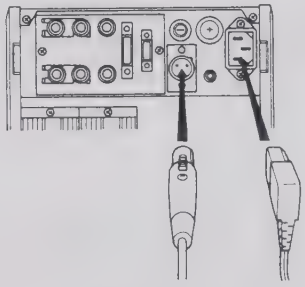


Fig. 3-4

Notes

1. After purchasing the battery, charge it once before using it.

2. If the battery is to be left unused for a long period of time, always disconnect it from the WR7500. This is done to prevent self-discharge.

4. INPUT SIGNAL CONNECTIONS

The following precaution should be observed with respect to the signal source connection.

> Under no circumstances should the voltage between the input terminals and ground (GND) be allowed to exceed 500Vpp.

4.1 Input Lines

The signal lines should, in general, be connected using the accessory input cable. This cable is a two-conductor, insulated, shielded cable with an input plug connected to it. It should be inserted as shown in Fig. 4-1, with the red lead connected to the (+) terminal, white lead connected to the (-) terminal and shield connected to the GRD terminal.

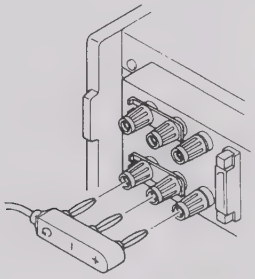


Fig. 4-1

4.2 Connection

The proper connection method will depend upon the characteristics of the signal source.

1 For a normal signal source, the connection should be made as shown in Fig. 4-2 (with the shorting bar remaining connected).

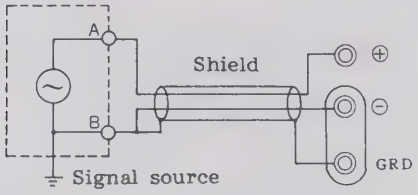


Fig. 4-2

2 For signal sources which have a bias voltage, use the side having a low impedance with respect to ground as the (-), as shown in Fig. 4-3 (with the shorting bar removed).

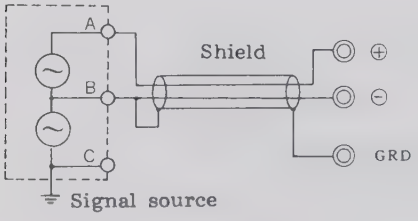


Fig. 4-3

3 For signal sources having a differential output, make the connections as shown in Fig. 4-4, with the side having low impedance connected to (-) for this connection as well (the shorting bar is removed).

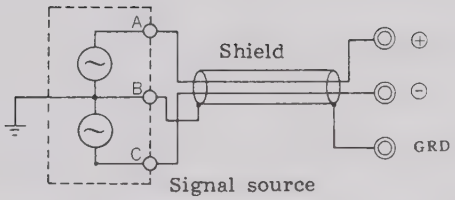


Fig. 4-4

- When measuring low-level signals having a high output impedance, the connection method to the protective ground (GND), guard (GRD) and (-) terminal should be made to obtain the best noise rejection effect.

- When making input cable connections, reverse insertion of the connector can result in the shorting bar shorting the signal source output. Take care that this type of error is not made.

5. MEASUREMENT AND RECORDING

5.1 Input Waveform Recording

5.1.1 Checks to be Made Before Applying Power

Before applying power, make the following checks.

- Set the HEAT switch to OFF (i.e., not depressed).
- Set the STOP switch to STOP (depressed).
- Set the CHART EXT. switch to OFF (not depressed).
- Check that the power cable and signal cable are properly connected.

5.1.2 Application of Power

Press the POWER switch to lock it in the in position. This applies power to the WR7500 as is indicated by the pilot lamp to the right of the switch lighting.

5.1.3 Setting the Chart Paper Feed Speed

Set the chart paper feed speed using the CHART SPEED switch to a speed which is appropriate to the signal to be measured and recorded.

5.1.4 Zero-Point Setting

Press the STOP switch to release its lock and feed the chart paper. With the HEAT switches ON, turn the preamp POSITION adjustments to set the pen zero positions.

5.1.5 Measurement and Recording

When the above preparation has been completed, if the preamp MEAS/OFF switch is set to MEAS, pens will be deflected by the measurement signals. If the overall HEAT switch is pressed to lock it in the in position, the pens will be powered and recording will start.

5.2 Marker Recording

One marker pen is used and is switched between a timing mark signal and an event mark signal.

Refer to Section 1.2 on the TIMING, EVENT and TIMING/EVENT switches.

6. REMOTE CONTROL

External control signals may be used to control the operation of the WR7500.

Pin B3 of the external control connector is connected to GND and pin B4 of this connector is pulled up to +5V through a 2.2kΩ resistor internally.

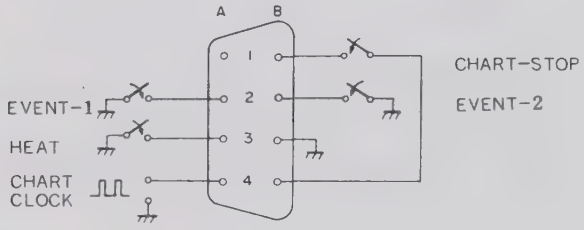
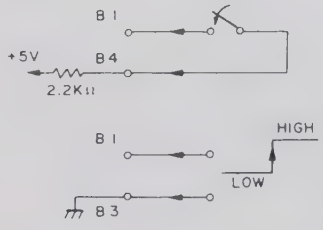


Fig. 6-1

6.1 CHART-STOP Signal

The stopping of the chart feed may be controlled. To use this control function, set the STOP switch to OFF (not depressed).



Contact signal: Chart stopped when pins B1 and B4 are shorted.

Chart stopped when a signal is applied between pins B1 and B3 (GND) and chart drive is normal when a high-level signal is applied between pins B1 and B3 (GND).

When the chart feed is in the stopped condition, pen deflection is stopped and pen heat is automatically switched OFF.

6.2 CHART-CLOCK Signal

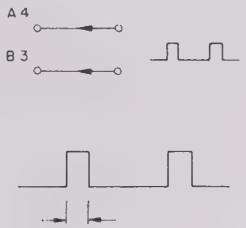


Chart paper feed may be synchronized to an external signal. To use this control function, set the CHART EXT. switch to EXT (depressed).

Input a TTL level signal between pins A4 and B3 (GND). This signal may have a frequency up to 4000pps (corresponding to 100mm/s chart feed speed).

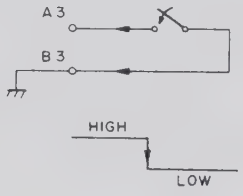
When the CHART-STOP function has been enabled or when the STOP switch has been pressed, chart feed will not be made even if this signal is input.

TTL Signal:

HIGH level : +2.8 ~ 5 V
LOW level : 0 ~ 0.5 V

6.3 HEAT Signal

An external signal may be used to turn the recording (i.e., heat) ON and OFF. To use this control function, set the HEAT switch to OFF (not depressed). Apply a signal between pins A3 and B3 (GND).

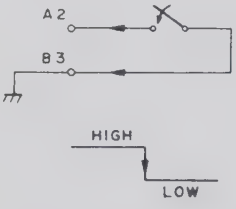


Contact input: Recording is made when these pins are shorted.

TTL Level: Recording is made when the input is at low level.

6.4 EVENT-1 Signal

This signal is used to record an event mark. To use this control function, set the TIMING/EVENT switch to the EVENT position. Apply an input signal between pins A2 and B3 (GND).

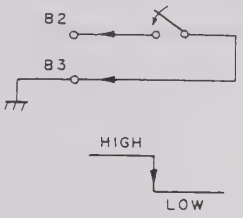


Contact signal: An event mark is recorded when the pins are shorted.

TTL Level: An event mark is recorded when the input is at low level.

6.5 EVENT-2 (Option) Signal

This control function is used with the additional marker. Apply an input signal between pins B2 and B3 (GND)



Contact signal: An event mark is recorded when the pins are shorted.

TTL Level: An event mark is recorded when the input is at low level.

7. PREAMP UNITS

These are DC amplifiers used to amplify the level of low-level input signals. There are two types, which differ in sensitivity.

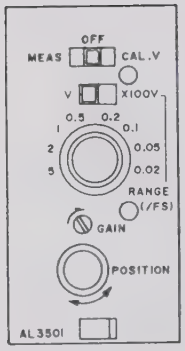


Fig. 7-1

MEAS./OFF/CAL.V

This switch is used to turn the input on and off and select the calibration voltage.

MEAS.: Pen deflects in accordance with the input signal.

OFF: Pen is separated from the input signal.

CAL.V: A calibration voltage is input.

V/x100V

This multiplier switch is used to select either V or x100V as the units which apply to the RANGE setting. (For type H, this switch selects either mV or V units)

RANGE

This switch sets the pen deflection for a given input signal level. It is used in combination with the multiplier (V/x100V or mV/V) switch to establish the sensitivity in the range 0.02 ∿ 500V/full scale.

For type H, the sensitivity range is 5mV ∿ 500V/full scale. While this switch can be set in an apparent range of 1000 ∿ 2000V/full scale, the actual input is limited to a maximum voltage of 500V. Take care that this limit is not exceeded.

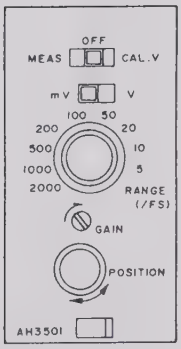


Fig. 7-2

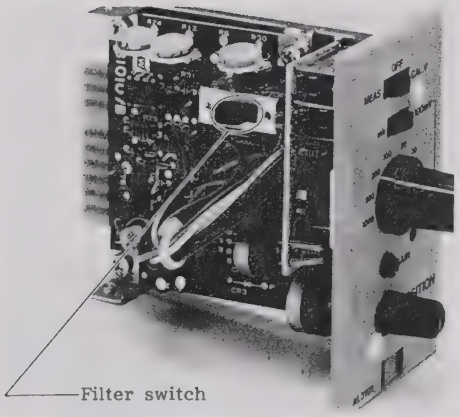


Fig. 7-3

GAIN

This is an amplitude adjustment which provides fine adjustment of sensitivity. It enables continuous adjustment between sensitivity ranges. With the MEAS/OFF/CAL.V switch set to CAL.V, a pen deflection of 1/2 of full scale corresponds to the RANGE sensitivity setting.

POSITION

This controls sets the zero point for the pen. Turning it clockwise moves the pen in the positive (left) direction.

FILTER

This switch controls the filter which may be inserted to eliminate electrical noise (hum) which may be superimposed on the input signal.

OFF: The input signal is fed to the amplifier circuit without filtering.

-20dB: The filter operates with an attenuation of 1/10 at 50Hz.

-40dB: The filter operates with an attenuation of 1/100 at 50Hz.

8. PRINTER (Option)

A printing head is used to record character information.

This printing can be performed in the internal mode or in the external mode. In the internal mode, information is printed as set on thumbwheel switches, and in the external mode, character information to be printed is received from an external device.

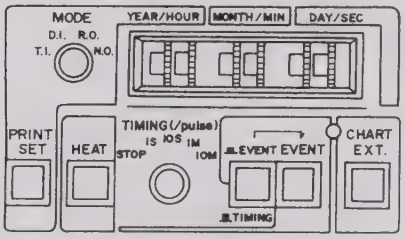


Fig. 8-1

8.1 Internal Mode

There are two submodes, normal output mode (N.O.) and real output mode (R.O.).

8.1.1 Normal Output Mode (N.O.)

In the normal output mode, automatic recording of the date, elapsed time and chart paper feed speed is performed.

The elapsed time is taken with 00:00:00 as the time when power is applied and is the accumulated elapsed time since power is first applied. If this time exceeds 24 hours, return is made to 00:00:00 and accumulation of time begins anew. However, when a time has been set on the thumbwheel switches, accumulation starts from that time setting.

(a) Procedure

1 Set the MODE switch to the N.O. position.

2 Set the thumbwheel switches to the year, month and day (with two digits for each value). The set data will be printed as is in the form of character information as follows.

(Example) January 1, 1985

8	5	0	1	0	1

3 Set the POWER switch to ON.

4 Set the chart paper feed speed.

5 Lower the pens, start chart feed and begin recording. The character recording will be repeated approximately every 300mm of chart paper length.

(Example)

At a feed speed of 100mm/min, the following recording will be made every 45 minutes after power is applied.

85.01.01	00:45	100MM/M
yr/mo/day	Elapsed time	Feed speed

CAUTION

- The data recorded is the data that was valid immediately prior to the start of recording.
- The elapsed time recorded is the hour, minute and second.
- If the thumbwheel switches are used to change the data during printing, or if the chart paper feed speed is changed during printing, the printed characters will not change. These will be updated, however, the next time the character print is made.
- When externally synced chart paper feed speed is used (i.e., when the EXT/HOUR/MIN switch is at EXT), EXTERNAL will be recorded instead of the chart feed speed.

8.1.2 Real Output Mode (R.O.)

In the real output mode, automatic printing of the date, time and chart paper feed speed is performed. The time is the value of an internal clock, which requires initial setting.

When the time reaches 24 hours, the date is automatically advanced.

(a) Procedure

1 Set the CHART switch to STOP.

2 Set the POWER switch to ON.

3 Set the MODE switch to T.I. (time in).

4 Set the thumbwheel switches to the time (hours, minutes and seconds from the left).

(Example)

10:15:10

5 Press the PRINT SET switch. When this is done, data will be written into the control computer (clock) and accumulation of time begins from the set time.

6 Set the MODE switch to D.I. (date in).

7 Set the thumbwheel switches to the year, month and day (starting from the left, with two digits for each value).

(Example) January 2, 1985

8 Press the PRINT SET switch. When this is done, the date will be written into the control computer (clock).

9 Set the MODE switch to R.O. (real out).

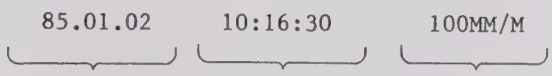
10 Set the chart paper feed speed.

11 Lower the pens and start chart feed to begin printing.

Character printing will be made at approximately every 300mm of chart paper length.

(Example)

At a chart feed speed of 100mm/min, the following type of character printing will be made.



yr/mo/day hr/min/sec Chart speed

CAUTION

- The data recorded is the data that was valid immediately prior to the start of recording.
- The elapsed time recorded is the hour, minute and second.
- When the hour exceeds 24 hours, the date is advanced except for February 28th, after which March 1st is set.
- If the chart feed speed setting is changed during printing, the printed information will not change. Updated information will be printed the next time.

- When externally synced chart paper feed speed is used (i.e., when the EXT/HOUR/MIN switch is at EXT), EXTERNAL will be recorded instead of the chart feed speed.

8.2 External Mode

The printer may be used to print character data from an external digital device.

To print character information from an external device, set the printer MODE switch to either the normal output mode (N.O. position) or the real output mode (R.O. position).

In both the normal and real modes, signals from an external device are not accepted during internal mode printing operations.

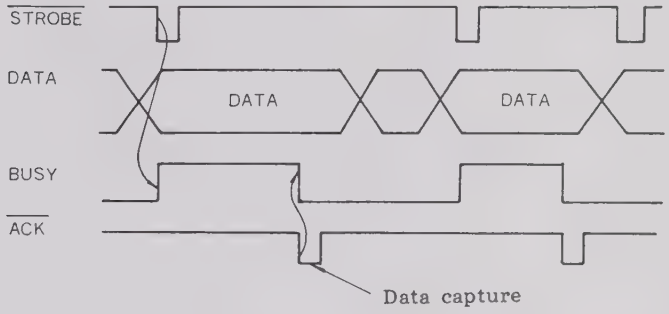
It should be remembered that the CPU controlling the printer is cleared when the power is first applied.

8.2.1 Interface

The printer interface accepts 8-bit characters conforming to the ASCII character code. The character pin arrangement and signal timing diagram are shown below. Signals are TTL level.

B		A
BUSY	8	DATA0
$\overline{\text{ACK}}$	7	DATA1
N.C.	6	DATA2
GND	5	DATA3
GND	4	DATA4
$\overline{\text{BUSY}}$	3	DATA5
DATA7	2	DATA6
N.C.	1	$\overline{\text{STROBE}}$

Table 8-1
Printer Connector



Signal transfer protocol between the WR7500 and an external device

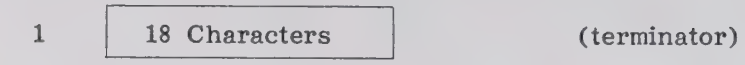
8.2.2 Operation

When an ASCII code signal is received from an external device, these characters are temporarily stored into memory as shown in the above protocol and sequentially printed as the chart is fed.

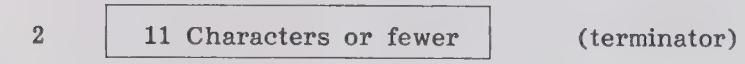
- In the normal mode (N.O.) and real mode (R.O.), after internal data is formatted appropriately, the character signal from an external device is received and printed.

8.2.3 Printing Examples

This description will use printing examples.

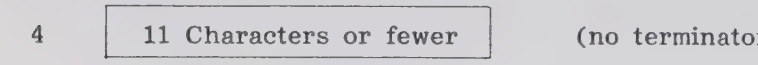


Once 12 characters are read into buffer memory, these 12 characters are printed and the remaining 6 characters are received.



Printing is made up to and including the terminator.

First, the first 12 characters are printed. The remaining characters are written into buffer memory but not printed. After this, internal data is also not printed.



Characters are read into buffer memory but not printed. After this, internal data is also not printed.

8.2.4 Code Table

The printer code table is as follows.

Row / Column	00	···	02	03	04	05	···	11	12	13	···
0	NUL		SP	0	@	P		−	タ	ミ	
1	TC_1(SOH)		!	1	A	Q		ア	チ	ム	
2	TC_2(STX)		〃	2	B	R		イ	ツ	メ	
3	TC_3(ETX)		#	3	C	S		ウ	テ	モ	
4	TC_4(EOT)		$	4	D	T		エ	ト	ヤ	
5	TC_5(ENQ)		%	5	E	U		オ	ナ	ユ	
6	TC_6(ACK)		&	6	F	V		カ	ニ	ヨ	
7	BEL		'	7	G	W		キ	ヌ	ラ	
8	FE_0(BS)		(	8	H	X		ク	ネ	リ	
9	FE_1(HT)		)	9	I	Y		ケ	ノ	ル	
10	FE_2(LF)		*	:	J	Z		コ	ハ	レ	
11	FE_3(VT)		+	;	K	[		サ	ヒ	ロ	
12	FE_4(FF)		,	<	L	¥		シ	フ	ワ	
13	FE_5(CR)		−	=	M	]		ス	ヘ	ン	
14			.	>	N	↑		セ	ホ	゛	
15			/	?	O	←		ソ	マ	゜	

* All characters in the 00 column are treated as terminators.

Table 8-2

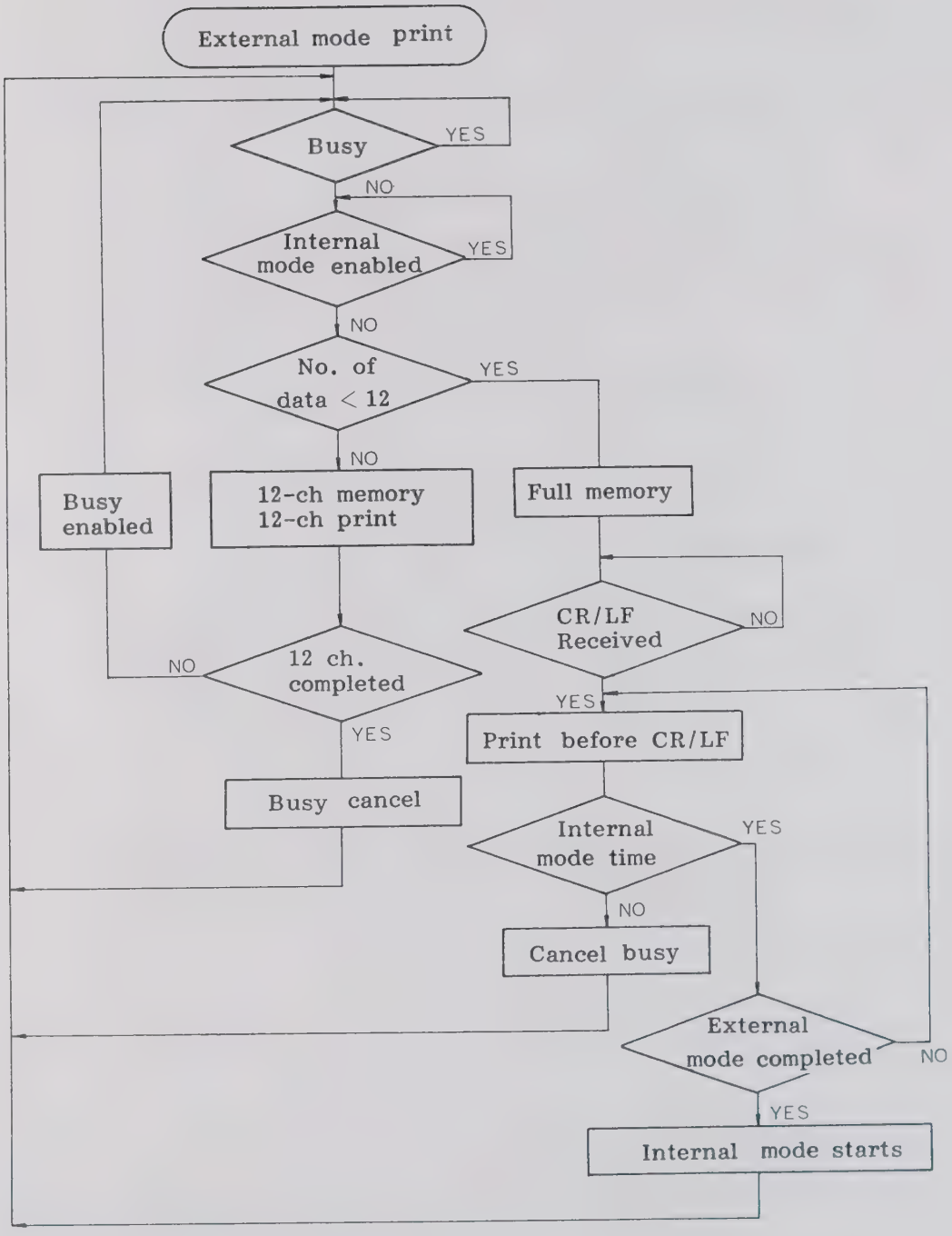


Fig. 8-2 External mode print 1 (NORMAL, REAL)

9. SPECIFICATIONS

9.1 Mainframe Specifications

No. of channels	1	2
Pen motor	GW7501	GS7501
Recording width	±40mm	±20mm
Chart paper feed speed	1, 2.5, 5, 10, 25, 50, 100mm/s & min and external sync	
Feed accuracy	±1.5% ±0.5mm	
Chart paper	Roll (length: 40m long)	
Recording method	Thermal	
Input type	Floating ground	
Input resistance	Potentiometric	
Input sensitivity	±2.5V/FS	
Accuracy	±0.7% (including linearity and deadband)	
Frequency characteristics	20mm p-p: 0 ∿ 30Hz 40mm p-p: 0 ∿ 25Hz 80mm p-p: 0 ∿ 20Hz +5%/-10%	10mm p-p: 0 ∿ 70Hz 20mm p-p: 0 ∿ 50Hz 40mm p-p: 0 ∿ 35Hz +5%/-10%
Time marker	STOP, 1s, 10s, 1min, 10min (switchable with the event marker)	
Event marker	Pushbutton or remote control (contact input or TTL-level signal) (Switchable with time marker)	
Chart paper feed stop	Pushbutton or remote control (contact input or TTL-level signal)	
External chart feed speed synchronization	Pitch: 0.025mm/pulse Frequency: 0 ∿ 4000pps (0 ∿ 100mm/s)	

Pen heat on/off	Pushbutton or remote control (contact input or TTL-level signal)	
Power requirements	100VAC (specifiable as 115/200/220/240VAC also), ±10%, 50/60Hz 12VDC (10.5 ∿ 15V)	
Power consumption	Ave.: 46VA, max.: 83VA	Ave.: 50VA, max.: 130VA
External dimensions (±3mm tolerance)	205(W) x 254(D) x 266(H)	
Weight	6.2kg	6.9kg
Operating environment	0 ∿ 45°C, 30 ∿ 80% RH	

9.2 Preamplifier Specifications

Input type	Floating with guard
Input resistance	1MΩ, fixed (allowable signal source resistance: 10kΩ or less)
Max. input voltage	500VDC (including common-mode voltage)
Measurement range (AL3501)	0.02, 0.05, 0.1, 0.2, 0.5, 1, 2, 5V/FS 2, 5, 10, 20, 50, 100, 200, 500V/FS
Switching accuracy	±1%
Measurement range (AH3501)	5, 10, 20, 50, 100, 200, 500, 1000, 2000mV/FS 5, 10, 20, 50, 100, 200, 500, 1000, 2000V/FS
Switching accuracy	±1%
Sensitivity adjustment	Continuous between ranges
Position adjustment	Anywhere in the full scale range
Calibration voltage	x2 the range setting
Common-mode rejection ratio	DC: 130dB, AC: 110dB (AL3501) DC: 140dB, AC: 120dB (AH3501)
Input filtering (at 50Hz)	-40dB/-20dB/OFF

9.3 Optional

Name	Model	Description
Additional event marker	B202	Mounted on the right side of the panel (as seen from front) and includes remote ON/OFF control (contacts or TTL level signal).
Printing function	B203	Information printed: Year, month, day, hour, minute, second and chart speed. In the normal mode, the time from power ON is accumulated. In the real mode, the time from a time setting is accumulated. External printing: ASCII Codes are printed (Centronics compatible)
Battery	B204	Operating time: Approx. 3hr (10Hz, 40mmp-p signal) Charging time: 20hr
Carrying case	B205	390 × 310 × 235 mm
Rack mount fixtures	B206 B207	DIN Standard EIA (inch) Standard
Z-Fold paper box	B208	Holds Z-fold paper (150mm fold width and 150m long)
Front panel input	B209	Input at a round connector on the front panel.
Metal cover with transparent panel	B210	Enables viewing of the recording surface.

* The additional event marker and printing function may not be installed on the same recorder.

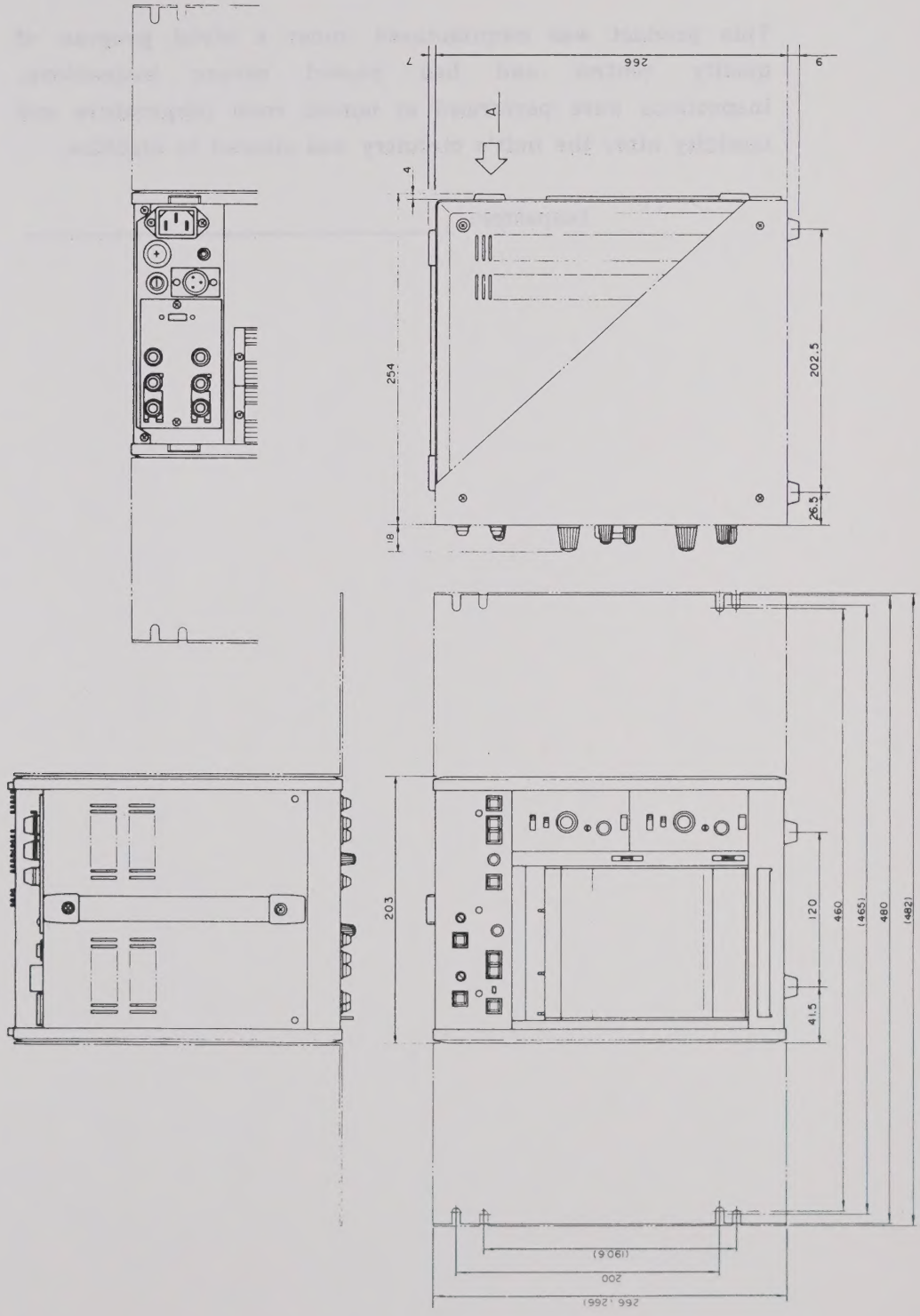
9.4 Accessories

Name	Qty.
Instruction manual	1
Power cable (DC)	1
Power cable (AC)	1
Input cables	2 (or 1)
Fuses (15A)	2
Fuses (2A or 4A)	2
Recording paper (roll)	1 roll (40m)
Remote connector	1

9.5 Supplies

Name	Model	Description
Recording paper	PR-220	40mm wide (50div) roll paper (40m long)
	PR-221	80mm wide (100div) roll paper (40m long)
	PZ-220	40mm wide (50div) Z-fold paper (150m long)
	PZ-221	80mm wide (100div) Z-fold paper (150m long)
Recording pens	KT-201	Recording pen for 40mm width
	KT-202	Recording pen for 80mm width
Fine-line recording pens (0.15mm recording)	KT-204	Recording pen for 40mm width
	KT-205	Recording pen for 80mm width
Marker pen	KT-213	For event/time markers
Additional marker pen	KT-214	For additional event marker

10. OUTER DIMENSIONS



11. INSPECTION CERTIFICATION

This product was manufactured under a strict program of quality control and has passed severe inspections. Inspections were performed at normal room temperature and humidity after the unit's circuitry was allowed to stabilize.

Inspector: _____

www.manualsplus.com
1035698